REMARKS

The present response is intended to be fully responsive to all points of rejection raised by the Examiner and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application is respectfully requested.

Claims 1-74 are pending in this case. Claims 49-53 have been rejected under 35 U.S.C. § 102(e). Claims 54-65, 67-73 have been rejected under 35 U.S.C. § 103(a). Claims 1-24, 26-43, 46-48 have been allowed. Claims 24, 44-45, 66, 74 are objected to. Independent claims 49, 54, 69 and dependent claims 44, 50-53, 59, 62, 65-66, 68, 70-74 have been amended. Claim 25 has been canceled without prejudice.

Replacement Drawing Sheets

Applicant submits herewith three replacement drawing sheets to correct typographical errors found in the drawings. Specifically, replacement sheets for Figures 2, 7 and 10 are being submitted. No new matter has been entered by these corrections.

Response to Claim Objections

The Examiner objected to claims 24, 44-45, 66, 74 due to several informalities. Applicant has amended these claims accordingly. Applicant respectfully submits that the claim amendments overcome the Examiner's objection to the claims. The Examiner is respectfully requested to withdraw the objection to the claims.

Response to 35 U.S.C. § 102(e) Rejections

The Examiner rejected claims 49-53 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,023,783 ("Divsalar et al.").

While continuing to traverse the Examiner's rejections, Applicant, in order to expedite the prosecution, has chosen to clarify and emphasize the crucial distinctions between the present invention and the devices of the patents cited by the Examiner. Specifically, representative claim 49 has been amended to include a method of generating soft bit information from soft symbol information, the method comprising the steps of receiving a plurality of soft symbol values for each symbol, determining, for each bit position of interest, a first soft symbol value corresponding to a maximum soft symbol value wherein the bit of interest is a zero and a second soft symbol value corresponding to a maximum soft symbol value wherein a bit of interest is a

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one, **utilizing an overall maximum soft symbol value for either the zero bit or the one bit in accordance with the value of the bit in the bit position of interest of the overall maximum soft symbol, utilizing for the other bit, the value of a soft symbol closest in Euclidean distance to the overall maximum soft symbol whose bit in the position of interest is opposite that of the analogous bit in the overall maximum soft symbol** and approximating a log likelihood ratio for a particular bit of interest as the difference between the second soft symbol value and the first soft symbol value.

Divsalar et al. teaches several improved turbo code apparatuses and methods encompassing several classes: (1) A data source is applied to two or more encoders with an interleaver between the source and each of the second and subsequent encoders. Each encoder outputs a code element which may be transmitted or stored. A parallel decoder provides the ability to decode the code elements to derive the original source information d without use of a received data signal corresponding to d. The output may be coupled to a multilevel trellis-coded modulator (TCM). (2) A data source d is applied to two or more encoders with an interleaver between the source and each of the second and subsequent encoders. Each of the encoders outputs a code element. In addition, the original data source d is output from the encoder. All of the output elements are coupled to a TCM. (3) At least two data sources are applied to two or more encoders with an interleaver between each source and each of the second and subsequent encoders. The output may be coupled to a TCM. (4) At least two data sources are applied to two or more encoders with at least two interleavers between each source and each of the second and subsequent encoders. (5) At least one data source is applied to one or more serially linked encoders through at least one interleaver. The output may be coupled to a TCM. The invention includes a novel way of terminating a turbo coder.

It is submitted that the Divsalar et al. teaches a method of operating the turbo decoder on bits and bit interleaving rather than symbol interleaving. It achieves this by obtaining the log likelihood ratios of the jth bit within the symbol using the Equation 17 (see col. 17, line 40). This equation requires the summation over all symbols whose bit of interest is 'one' and over all symbols whose bit of interest is 'zero'.

In contrast, the method of the present invention uses an **approximation** to simplify the calculation of the bit log likelihood ratios (i.e. soft bit information). The approximation is based on the difference between the **maximum** soft symbol whose bit value in the bit position of

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interest is a one and the **maximum** soft symbol whose bit value in the bit position of interest is a zero. This is contrast with the alternative method of summing **all** soft symbols for 'zero' and 'one' bits in the bit position of interest. This is expressed in Equation 14 of the specification (see page 21, line 1). This method of determining the soft bit information is neither taught nor suggested by Divsalar et al.

Further, the method of the present invention determines the maximum soft symbol information in a very different way than Divsalar et al. For each soft bit value to be computed, two soft symbol values are required. One is used for the maximum soft symbol whose bit value in the bit position of interest is a one and the other if used for the maximum soft symbol whose bit value in the bit position of interest is a zero. Both are the maximum soft symbol values for the respective 'one' and 'zero' bits. The overall maximum soft symbol is used for one of the bits while the soft symbol value of the nearest neighbor symbol whose bit is opposite to that of the analogous bit in the overall maximum soft symbol is used for the other. This method of determining the maximum soft symbol whose bit value in the bit position of interest is a one and the maximum soft symbol whose bit value in the bit position of interest is a zero is neither taught nor suggested by Divsalar et al.

It is thus believed that claims 49-53 overcome the Examiner's rejection based on § 102(e) grounds. The Examiner is respectfully requested to withdraw the rejection based on § 102(e).

Response to 35 U.S.C. § 103(a) Rejections

The Examiner rejected claims 54-65, 67-73 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,023,783 ("Divsalar et al.").

In light of the arguments made above in connection with the Examiner's § 102(e) rejection regarding independent claims 49-53, and the amendments made to independent claims 54 and 69, Applicant submits that independent claims 54 and 69 are not obvious in light of Divsalar et al. Claims 55-65, 67-68 depend from claim 54 and claims 70-73 depend from claim 69. Accordingly, Applicant also submits that dependent claims 55-65, 67-68 and 70-73 are not obvious in light of Divsalar et al. as well. The Applicant respectfully traverses the rejection of claims 54-65, 67-73 and submit that the presently claimed invention is patently distinct over Divsalar et al. The Examiner is respectfully requested to withdraw the rejection based on 35 U.S.C. §103(a).

Correction of Typographical Errors

Amendments haven been made to correct grammatical and usage errors in the specification. No new matter has been added to the application by these amendments.

Conclusion

In view of the above amendments and remarks, it is respectfully submitted that independent claims 1, 18, 32, 49, 54, 69 and hence dependent claims 2-17, 19-24, 26-31, 33-48, 50-53, 55-68, 70-74 are now in condition for allowance. Prompt notice of allowance is respectfully solicited.

In light of the Amendments and the arguments set forth above, Applicant earnestly believes that they are entitled to a letters patent, and respectively solicit the Examiner to expedite prosecution of this patent applications to issuance. Should the Examiner have any questions, the Examiner is encouraged to telephone the undersigned.

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Respectfully submitted,

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